PERFECT SIGHT:

HOW TO RETAIN IT.

IMPERFECT SIGHT:

HOW TO RESTORE IT.

PUBLISHED BY

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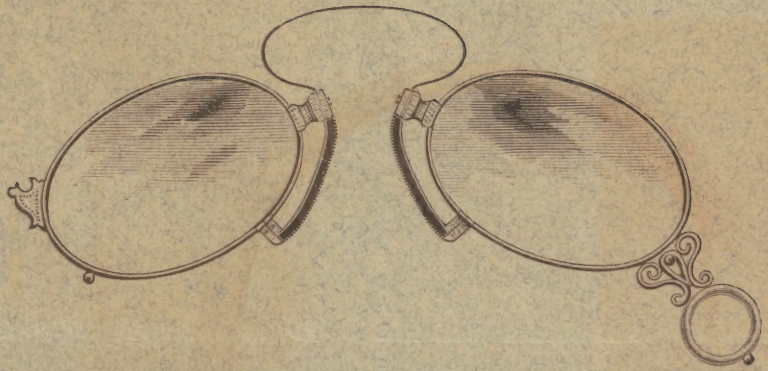

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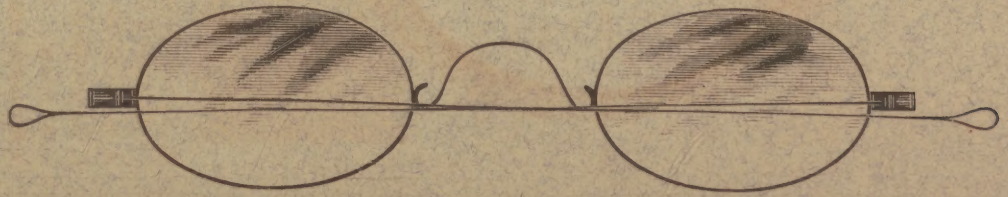


PERFECT EYES AND PERFECT VISION

—BY—

JAMES W. QUEEN & CO.

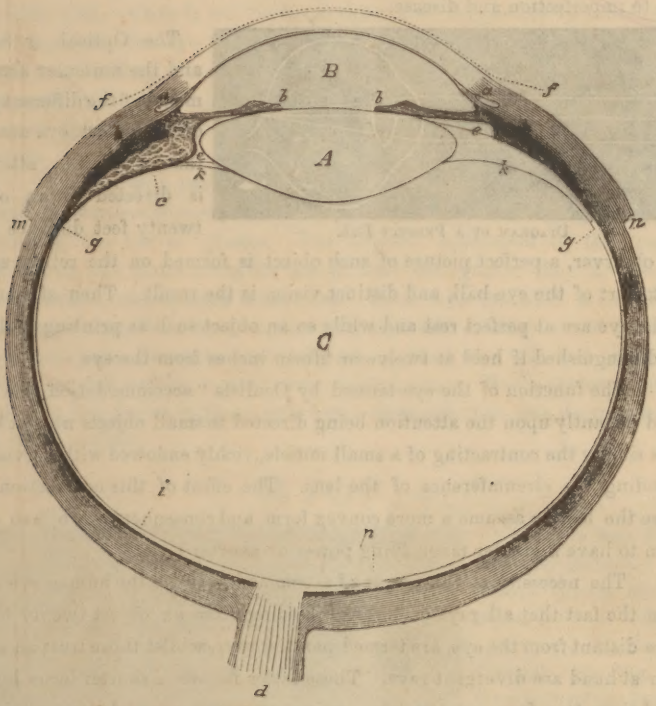


FIGURE OF THE EYE. (After HELMHOLTZ.)

B, *Aqueous humor* in the anterior chamber of the eye.

A, the crystalline lens.

C, the vitreous humor.

i, the retina.

e, the zonula zinnii.

g, the choroid.

h, the ciliary muscle surrounding the cumference of the lens.

b, the iris.

d, the optic nerve.

a, Schlemm's canal.

p, the fovea centralis.

k, the capsule of lens.

f f, the epithelium of cornea.

m, *n*, the insertion of muscles in the sclerotica.

The Perfect Eye.

Without doubt the human eye with its wonderful arrangement of muscles, coats, humors and lens as illustrated by the diagram on opposite page was perfect, when direct from the hands of our "Great Creator," but, by the fall of man, it as well as all other organs of the human body, become subject to imperfection and disease.

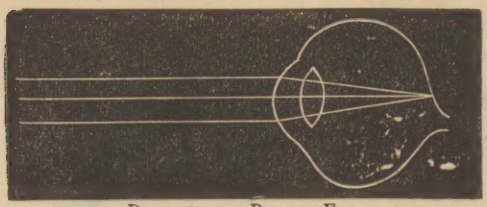


Diagram of a Perfect Eye.

The Optical or Seeing and the muscular arrangements of the different parts of a perfect eye are such that when the attention is directed to an object twenty feet distance from the observer, a perfect picture of such object is formed on the retina at the back part of the eye-ball, and distinct vision is the result. Then all muscles of the eye are at perfect rest and while so an object such as printing could not be distinguished if held at twelve or fifteen inches from the eye.

The function of the eye termed by Oculists "accommodation," is exercised instantly upon the attention being directed to small objects near at hand. It is simply the contracting of a small muscle, richly endowed with nerves surrounding the circumference of the lens. The effect of this contraction is to cause the lens to assume a more convex form, and consequently while so acted upon to have a greater magnifying power or shorter focus.

The necessity of this power of accommodation for the human eye arises from the fact that all rays of light proceeding from an object twenty feet or more distant from the eye, are termed parallel rays, whilst those from an object near at hand are divergent rays. These latter require a shorter focus lens to bend them to a focus on the same retina on which parallel rays produce a clear picture.

The foregoing description of the perfect eye, will facilitate a comprehension of our description of the different causes of defective eye-sight and the methods employed by science to correct or improve them.

IMPERFECT EYES.

The five most common causes of weak eyes and defective vision which are susceptible of relief and improvement by using spectacles, are termed by Oculists respectively: Presbyopia, Myopia, Hypermetropia, Astigmatism and Diplopia.

PRESBYOPIA.

"Old-sight," "far-sight" or "Presbyopia" as it is variously called, is a physiological defect depending upon the hardening of the lens of the eye so that it can no longer change its shape to the same extent as in former years. This process of hardening begins quite early in life and gradually increases, but in natural eyes causes no inconvenience until middle life—from the 40th to 45th year,—when it will be found difficult or impossible in ordinary light to longer see the eye of a cambric needle, or to read diamond type nearer than 8 inches from the eyes. At this point *Presbyopia* is said to begin, and for comfortable use of the eyes by gas-light it is found necessary to use a weak convex glass to assist the lenses of the eyes in focusing rays of light upon the retina.

Persons with properly shaped eyes cannot hope to avoid the inconvenience thus occasioned, nor will they retain their "young sight" longer by avoiding the use of glasses. The popular impression in this regard is erroneous, and in deferring the use of their first glasses they are subjecting themselves to unnecessary discomfort. Those who are able to put off their use longer than the 45th year, and still maintain distinct vision for reading fine print have always been slightly near-sighted, and will find their distant vision is improved by a weak near-sighted glass. Many persons have this defect in low degree without ever being conscious that they do not see as well as other persons.

MYOPIA.

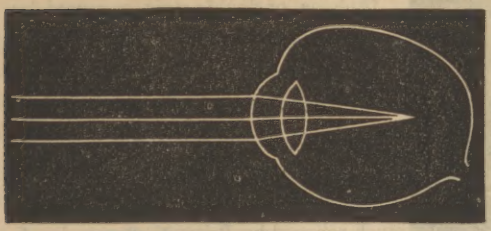


Diagram of a Myopic Eye.

Myopia or Near-Sightedness, the difficulty to see distant objects distinctly, arises from a defectively constructed eye-ball, the distance from the lens to the retina at the back part of the eye being too great, and as a consequence the rays of light coming from a distant object are bent to a focus before reaching the retina, and form there only confused pictures. Myopia is a condition of the eyes existing at birth in nine-tenths of the cases where it is discovered, but it may be contracted in youth, by long continued application to reading, writing, or sewing, particularly where the light is poor and the head is held close to the work to overcome the want of light. It is then due either to the failure of the muscle of accommodation to relax itself, or of the lens to regain its normal form. Near-Sighted eyes are generally large and quite prominent, and require concave lenses to correct their defect.

HYPERMETROPIA.

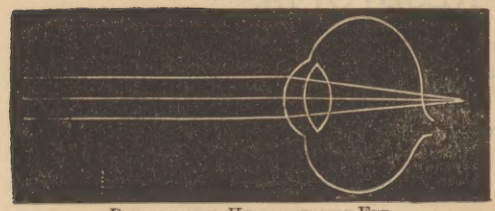
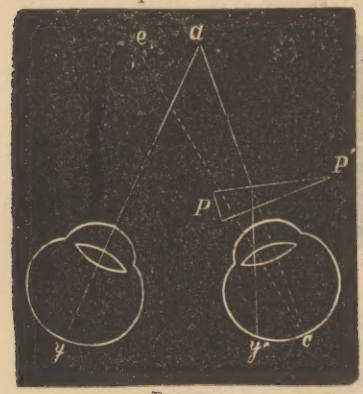


DIAGRAM OF A HYPERMETROPIC EYE.

HYPERMETROPIA also arises from a defectively constructed eye-ball, but it is the reverse of Myopia, being too short from the lens to the retina, consequently the rays of light from distant objects are not sufficiently bent so that they will come to a focus on the retina. The impression of the object formed on the retina is confused, very much the same as is the case with Myopic eyes. Hypermetropia is also a birth inheritance where it is found to exist in after years, old-sighted people are apt to become Hypermetropic after their sixtieth year. Hypermetropic eyes are generally very small and deep sunken in their sockets. Convex Glasses are required for correcting the defect in Hypermetropic Eyes.

Astigmatism is a defect of vision arising from a want of conformity in the outer curve of the cornea, or front portion of the eye-ball opposite the pupil. The cornea in a perfect eye is the segment of a sphere, but in astigmatic eyes it has the form of a cylindrical curve. This defect also exists at birth if discovered afterward, and is overcome by the use of a lens having a cylindrical instead of a spherical form.



DIPLOPIA.

Diplopia, or double-sight is caused by weakness of the muscles which move the eye from side to side. They are no longer able to hold the two eyes steadily fixed toward the object and the eye moving out or in, causes the individual to see the object double. This can often be very much relieved by Prismatic Spectacles.

Cataract is a term used to denote the gradual loss of sight, arising from the lens of the eye becoming turbid. At the proper time the lens is removed by an Oculist after which very strong convex lenses will restore the vision.

There are many other causes producing defective sight, but they are mostly complications and combinations of those above described, and therefore we will not particularize them.

There is very great public need for information regarding the proper selection of spectacles, and care of the eyes. A large proportion of habitually weak eye-sight may be entirely remedied by the use of a carefully adjusted glass to assist the sight, and thereby remove the undue strain to which the eyes under certain conditions are subjected.

Before the age of 40 years, eyes which are properly constructed should without pain or undue fatigue bear the usual amount of strain required of them. When a few hours use in reading or sewing in the evening, brings on an uncomfortable sense of fatigue, or is attended with blurring of the print, which again becomes distinct after a momentary rest, or burning and itching of the eyes or eyelids, or it may be actual pain in the eyes or forehead and temples, it is certain that something is wrong. It may be due to an irritation or inflammation of the choroid coat or retina of the eye, but in most cases will be found to depend upon some defect in the structure of the eye, influencing its power in bending the rays of light or focusing them upon the retina in such a manner as to give a distinct image of the object looked at.

Physicians who give their special attention to the eye and its defects, tell us, the most frequently occurring cause of weak eyes is the defect called *Hypermetropia*, pp. 4, the term Oculists designate, is an eye that is too short from before backwards—in the course pursued by the rays of light entering the eye. In such eyes, when at rest the rays of light coming from distant objects, in place of being bent to a focus on the retina and there making an accurate picture, as would be the case in a model eye would find their focal point behind the eye. Consequently, before reaching their focus they are intercepted by the retina which only receives a circle of light upon it in place of a well defined picture. Nature has made it possible however, for persons having such eyes, to see distinctly by making their crystalline lens stronger, *i. e.* shortening its focal length, so that the focus is brought forward onto the retina and they see for the time being distinctly. This is done by means of a small muscle situated near the circumference of the lens within the eye-ball. In order to maintain distinct vision this muscle of accommodation must be kept in a constant state of tension under which it soon becomes exhausted and gives up, or contracts spasmodically, in the first case causing the blurring and indistinct vision already alluded to, in the last causing pain which may be felt in the eye but is oftener referred to the forehead and temples.

This is often the undiscovered cause of the headaches and neuralgias from which so many persons are constant or periodical sufferers. This too

is one of the fruitful causes of the sick headaches, etc., which are the penalty frequently paid for an evening spent at a lecture or place of amusement, or at church; the burning in the eyes, etc., being laid to bright gas-light, when in reality it was caused by the strain upon the little muscle within the eye, in maintaining distinct vision. The extreme annoyance it is possible to occasion by muscular strain will be vividly illustrated by holding a moderate weight in the hand at arm's length without interruption, for half an hour or even less.

Such persons will find entire relief from these annoying and painful symptoms by a properly adjusted pair of glasses, which act by assisting the crystalline lens of the eye and thus removing the necessity for the muscular strain. In selecting a glass however, they are confronted with the difficulty of not being able to find any glass with which they can see as distinctly as with the naked eye. This results from the habit of always using involuntarily the muscles of accommodation when they desire to see distinctly, and it is only when this is relaxed that the glass improves the sight. Under these circumstances the proper course is to consult an Oculist, and have the eye carefully measured, and the appropriate glass ordered from the Optician.

That this is the most judicious course to pursue, grows out of the fact, also, that eyes which have long been subject to this strain, become inflamed in their interior and need the medical care of a skilled Oculist.

We make but a closing allusion to Myopia or near-sight for the reason that, with this defect we do not care to encourage persons to selection of glasses. Near-sighted eyes, especially in young people are rarely healthy eyes, and in wearing glasses should only do so by the advice and careful measurement of the Oculist. Myopia is all the more serious from the wide-spread impression that near-sighted eyes are unusually strong.

Myopia or near-sight and Hypermetropia, may each be complicated with *astigmatism*, a name given to unequal curvature of the cornea. This condition of affairs makes the eyes still more uncomfortable, and in the case of Myopia makes it still more dangerous. Persons having this defect are apt to be uncertain in their vision. In reading moderately fine print they miscall the small words and must take time to study or make up their minds what the word really is. Very many people who wonder why it is they cannot get glasses to suit their eyes as other people do, and children who learn to read with difficulty, annoying their parents and teachers by their apparent stupidity, are troubled with astigmatism which can only be remedied by cylindrical glasses, carefully ground to the Oculist's order after accurate measurement of the defect.

Specimen Readings For Testing the Power of Vision.

No. 1.

We again turn from the siege of Boston, to the invasion of Canada, which at that time shared the anxious thoughts of Washington. His last accounts of the movements of Arnold, left him at Point Levi, opposite to Quebec. Something brilliant from that daring officer was anticipated. It was his intention to cross the river immediately. Had he done so, he might have carried the town by a *coup de main;* for terror as well as disaffection prevailed among the inhabitants. At Point Levi, however, he was brought to a stand; not a boat was to be found there. Letters which he had dispatched some days previously, by two Indians, to Generals Schuyler and Montgomery, had been carried by his faithless messengers to Caramhe, the lieutenant-governor, who thus apprised of the impending danger, had caused all the boats of Point Levi to be either removed or destroyed. Arnold was not a man to be disheartened by difficulties. With great exertions he procured about forty birch canoes from the Canadians and Indians, with forty of the latter to navigate them; but stormy winds arose, and for some days

No. 1 Test should be distinctly read when held as near the eyes as nine inches by most people until their forty-fifth year.

If it must be held farther off than nine inches, Presbyoptia has commenced, if nearer, then the eyes are Myopic or near-sighted.

No. 2.

difficulty stared him in the face. A strong line of walls and bastions traversed the promontory from one of its precipitous sides to the other; inclosing the upper and lower town. On the right, the great bastion of Cape Diamond crowned the rocky height of that name. On the left was the bastion of La Potasse, close by the gate of St. John's, opening upon the barracks; the gate where Wolfe's antagonist, the gallant Montcalm, received his death-wound. A council of war was now held. Arnold, who had some knowledge of the place, was for dashing forward at once and storming the

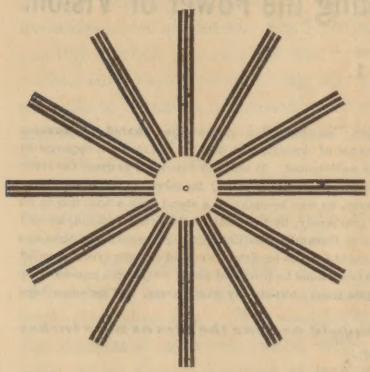
No. 2 Test should be distinctly read by perfect eyes, as near as eight inches.

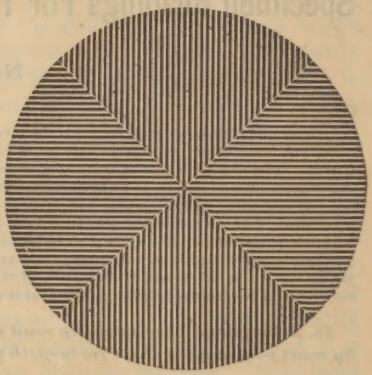
No. 3.

Colonies the surrender of the place. Some of the disaffected and faint-hearted were inclined to open the gates, but were held in check by the mastiff loyalty of Maclean. The veteran guarded the gate with his Highlanders; forbade all communication with the besiegers, and fired upon their flag as an ensign of rebellion

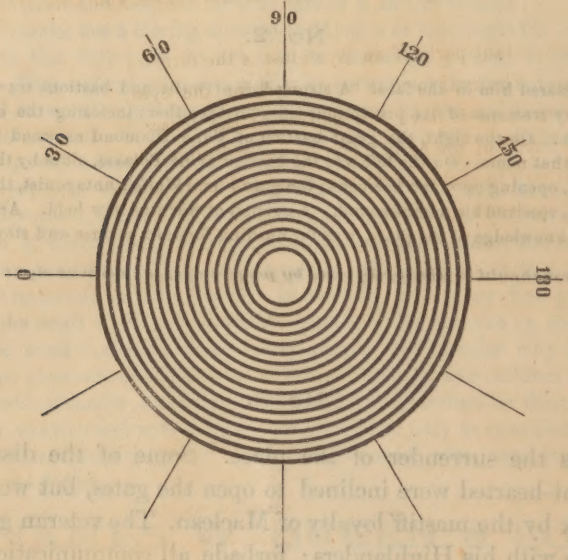
No. 3 Test should be distinctly read by perfect eyes as near as seven inches.

DIAGRAMS FOR DETECTING ASTIGMATISM.





When held ten inches from the eyes, if the lines at top and bottom of these figures are indistinct and blurred, and those at the sides are distinct and clearly defined, or the reverse, the eyes are Astigmatic.



If there is a blurr across this figure in any direction, and it is clear in the opposite direction, the eyes are Astigmatic. One eye may be Astigmatic and the other not—this may be detected by closing the eyes alternately.

HINTS ON SPECTACLES AND EYE GLASSES.

The important parts of a perfect pair of Spectacles are the sides or temples, the nose-piece or bridge, and the lenses.

The sides should be elastic and yet firm enough to hold the lenses securely and correctly to their position before the eyes.

The nose-piece should be of the proper length and its curve of the right depth so that the centre of each lense shall be opposite the pupil of the eye.

For reading-spectacles the curve of the bridge should be deep and the bridge at the curve bent out from line of the lenses. For distant-sight the curve of the bridge should be quite shallow and not bent forward from line of lenses.

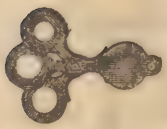
In order to bring the surface of the lenses at right angles to the axes of the eyes when the spectacles are on the face, we have devised the plan of etting the sides at an angle with the line of the lenses, and find it to work admirably.

The important parts of an Eye glass is the form of the eye, the spring and the lense. The oval form is best suited for the eyes, as it is impossible with any other shape to have the centres of the lenses to correspond or be opposite the pupils of the eyes. The spring or bridge must be of the form and strength that will in each case fit the nose and maintain the lenses in their proper position before the eyes.

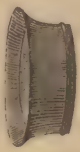
Spectacle-lenses are double convex or concave, Periscopic Convex or Concave Plano Cylindrical and Sphero Cylindrical. The material of which they are made are Crystal Brazilian Quartz, commonly called pebbles and flint glass.

Pebble-lenses possess the advantage of being extremely hard and do not scratch or break readily. They bear a very much higher polish than glass, and are more refractive and therefore not so thick. Next to pebbles fine white flint is a good material for spectacle-lenses, and of it are the lenses found in ordinary spectacles made. Traveling venders of spectacles are very apt to impose ordinary glasses for pebbles upon those whom they may persuade into buying of their wares, never buy spectacles of a pedlar. The best form for spectacle-lenses is the Concavo Convex or Periscopic.

Our Cobalt lenses are very excellent for those who use their eyes much over white paper or at white sewing, particularly after gas-light.

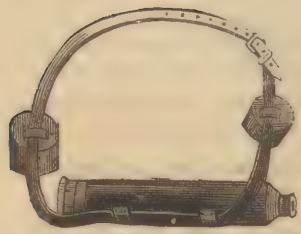


Pocket Magnifying Glasses.



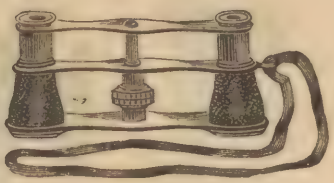
Engravers' Glasses.

Astronomical Telescopes.



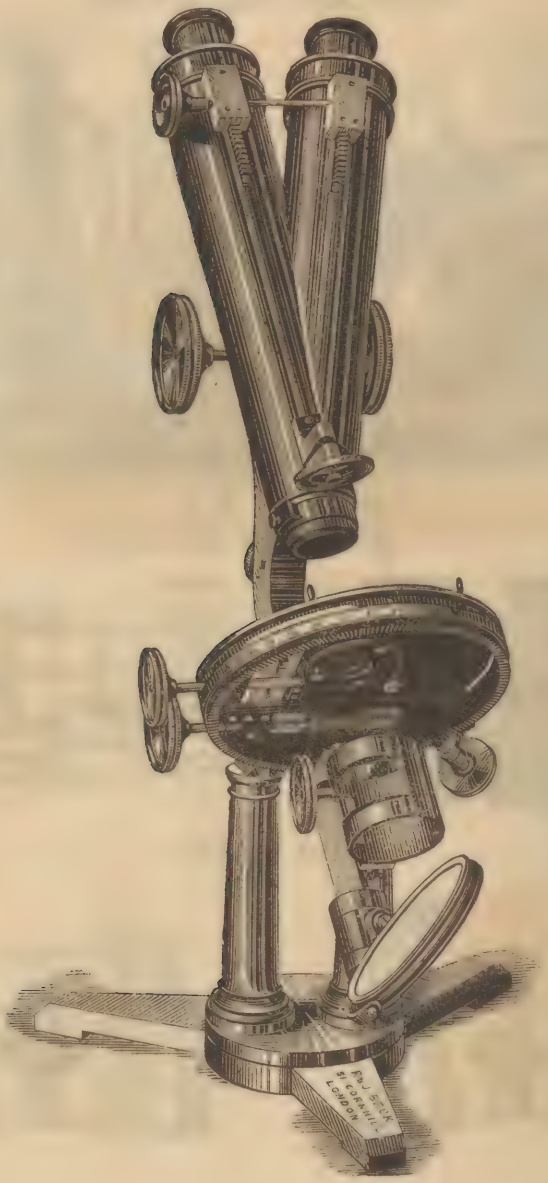
SPY GLASSES.

MARINE AND FIELD GLASSES.



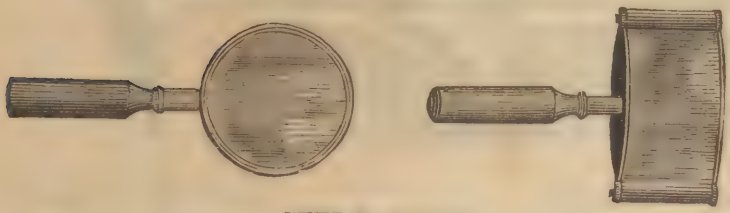
OPERA GLASSES.

MICROSCOPES.



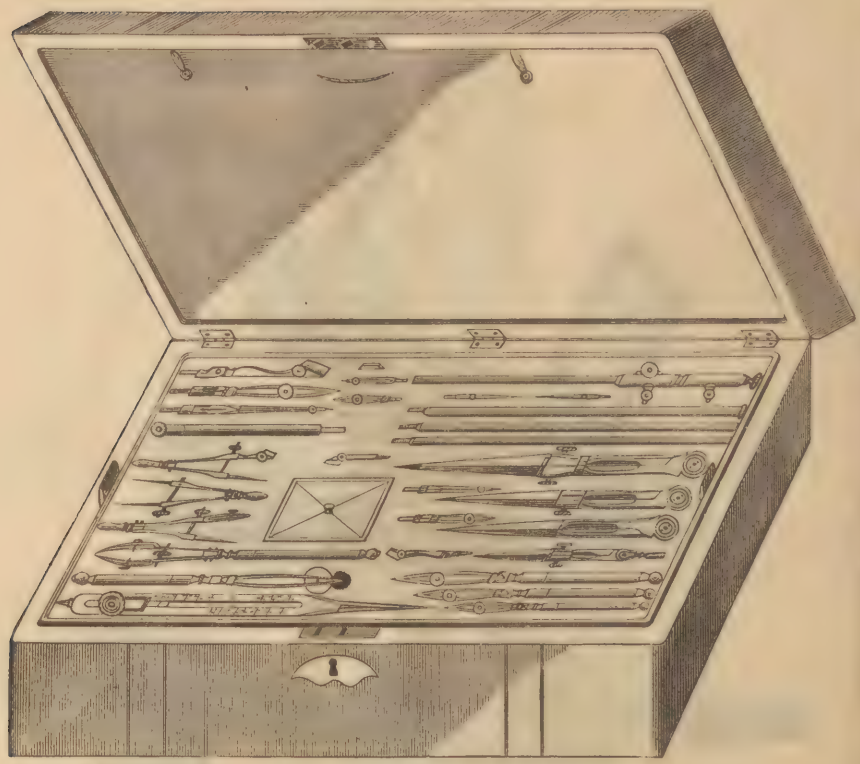
GRAPHOSCOPES.

READING GLASSES.



STEREOSCOPES.

DRAWING INSTRUMENTS.

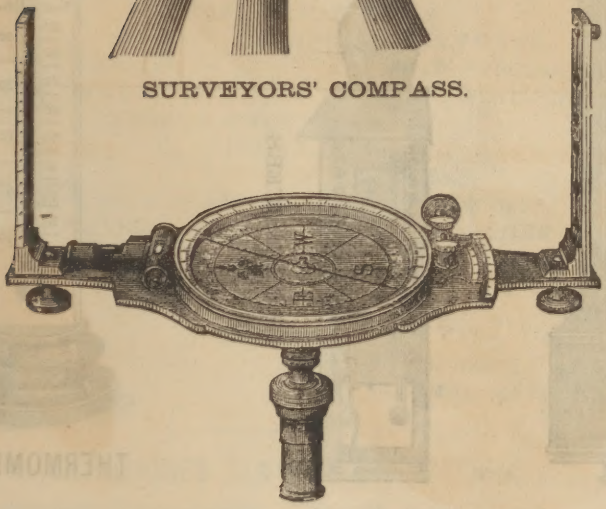


TAPE MEASURES.

POCKET COMPASSES.

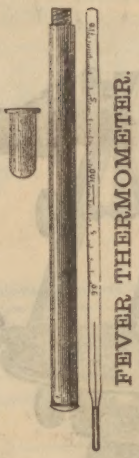
SURVEYORS' TRANSITS.

SURVEYORS' COMPASS.



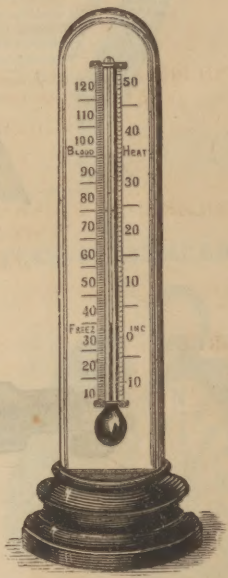
BAROMETERS.

FEVER THERMOMETER.



ANEROID BAROMETERS.

HYGROMETERS.



THERMOMETERS.

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RUBBER EYE GLASSES,
SHELL EYE GLASSES,
FRAMELESS EYE GLASSES,
READING GLASSES,
PULPIT SPECTACLES, COBALT EYE GLASSES,
RIDING SPECTACLES, COBALT SPECTACLES,
SHOOTING SPECTACLES,
CATARACT SPECTACLES,
ASTIGMATIC SPECTACLES,
COLORED EYE GLASSES, PRISMATIC SPECTACLES,
EYE PROTECTORS, ARTIFICIAL EYES,
OPERA GLASSES,
FIELD GLASSES,
SPY GLASSES,
GREEN SHADES, for one or both Eyes, TELESCOPES,
THERMOMETERS, STEREOSCOPES,
MICROSCOPES,
BAROMETERS,
DRAWING INSTRUMENTS,
TAPE MEASURES,
POCKET COMPASSES,
DRAWING MATERIALS, &c.

CATALOGUES SENT ON APPLICATION.

Part 1st—Mathematical Instruments.
Part 2d—Optical Instruments.
Part 3d—Magic Lanterns.
Part 4th—Philosophical Instruments.

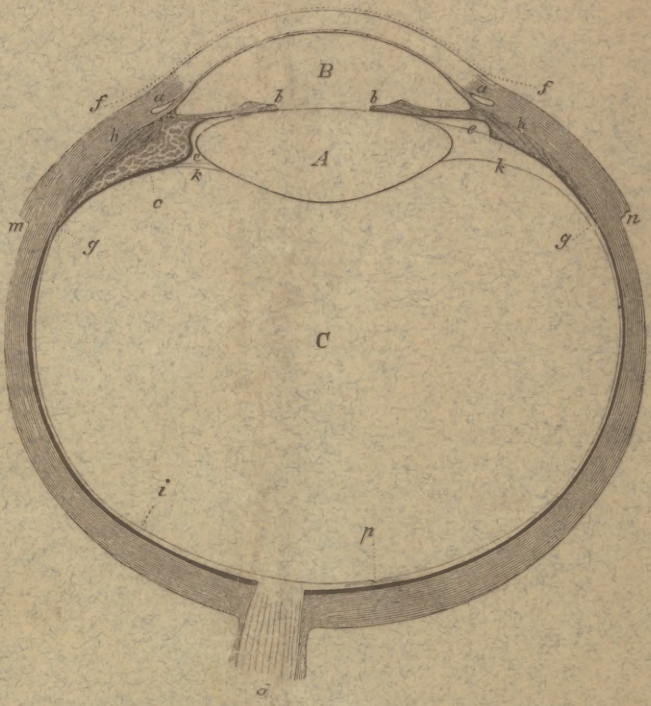

FIGURE OF THE EYE. (After HELMHOLTZ.)